UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,619	05/26/2006	Jan Boer	Boer-10-6-6-6	6190

47386 7590 11/09/2009

RYAN, MASON & LEWIS, LLP
1300 POST ROAD
SUITE 205
FAIRFIELD, CT 06824

EXAMINER	
ELPENORD, CANDAL	
ART UNIT	PAPER NUMBER
2473	

MAIL DATE	DELIVERY MODE
11/09/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,619	BOER ET AL.	
	Examiner	Art Unit	
	CANDAL ELPENORD	2473	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *August 06, 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-17,19-24,26-28,30,34 and 38-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-17,19-24,26-28,30,34 and 38-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Reopened Prosecution

1. This is in response to an Appeal Brief filed on August 06, 2009. No claims have been amended. No claims have been cancelled. No claims have been added. **Claims 1-4, 6-17, 19-24, 26-28, 30, 34, 38-41** remain pending in the application.

In view of the appeal brief filed on August 06, 2009, PROSECUTION IS HEREBY REOPENED. Further details set forth below.

2. Applicant's arguments, see Appeal Brief filed on August 06, 2009, with respect to the rejection(s) of claim(s) **1-4, 6-17, 19-24, 26-28, 30, 34, 38-41** under U.S.C 102(e) and 103 (a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Gardner (US 2005/0233709 A1), Perahia et al (US 7,352,688 B1), Catreux et al (US 6,802,035 B2) and Kadous et al (US 2004/0121730 A1).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1-4, 6-17, 19-24, 26-28, 38-41** rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, 14, 22, 26, 38, the phrase "can be interpreted" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claims 3-4, 6-13, 15-17, 19-21, 23-24, 27-28 and 39-41 are rejected by virtue of their dependency on claims 1, 14, 22, 26 and 38 respectively.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 1-4, 6, 8-13, 14-17, 19, 21, 38-41** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al (US 2005/0233709) in view of Perahia et al (US 7,352,688 B1).

Regarding claims 1, **14**, Gardner '709 a method (noted: method for transmitting where two or more transmitting antennas may be used, paragraph 0022, 0072, 0077, fig. 3 to fig. 4) for transmitting one or more training symbols (Noted: transmission of long training symbol as referenced by fig. 4, L2 , L3, and L4, paragraphs 0034-0038) in a multiple antenna communication system (fig. 3, MIMO Antennas 102, 104, fig. 8, see Transmitter 0, and Transmitter 1,paragraphs 0056, 0022), said method comprising the step of transmitting from a transmitter having N antennas (noted: method for transmitting where two or more transmitting antennas may be used, paragraph 0022, 0072, 0077, fig. 3 to fig. 4, see fig. 8, Transmitter 0, Transmitter 1) at least one training symbol using at least one antenna, such that said at least one training symbol can be interpreted by a receiver having M antennas (fig. 3, Receiving Legacy Antenna, paragraphs 0022, 0025, noted: receiver detecting the received long training symbols, paragraph 0034, "the Signal filed provides the receiver with information about the length of the packet and how long to defer", paragraph 0055, fig. 1, fig. 4, and fig. 8), where M is less than N (noted: more than one transmit antenna or single receive antenna,

paragraph 0022, lines 7-14) and wherein said at least one training symbol comprises a plurality of subcarriers (see, “L4 long training symbol containing plurality of subcarriers", paragraph 0052, lines 6-12).

Regarding claims 2, **15**, Gardner ‘709 the method of claim 1, wherein said receiver is a SISO receive (see, SISO legacy device, paragraph 0028, fig. 3, Receiving Legacy Antenna, paragraphs 0022, 0025, noted: receiver detecting the received long training symbols, paragraph 0034, “the Signal filed provides the receiver with information about the length of the packet and how long to defer”, paragraph 0055, fig. 1, fig. 4, and fig. 8).

Regarding claims 3, **16**, Gardner ‘709 the method, wherein said at least one training symbol is an 802. 11 a/g training symbol (noted: transmitting of a preamble using legacy device as referenced by IEEE 802.111 and IEEE 802.11g, paragraphs 0027-0028, 0062).

Regarding claims 4, **17**, Gardner ‘709 the method, wherein said at least one training symbol comprises at least one long training symbol (Noted: transmission of long training symbol as referenced by fig. 4, L2 , L3, and L4, paragraphs 0034-0038) and at least one SIGNAL field (Noted: Signal according to IEEE 802.11a, paragraph 0078, 0005, fig. 1, Signal Filed, paragraph 0059).

Regarding claims 6, **19**, Gardner ‘709 the method, wherein said SIGNAL field (Noted: Signal according to IEEE 802.11a, paragraph 0078, 0005, fig. 1, Signal Filed,

paragraph 0059) indicates a duration that a receiver should deter until a subsequent transmission (fig. 3, Receiving Legacy Antenna, paragraphs 0022, lines 6-14, 0025, noted: receiver detecting the received long training symbols, paragraph 0034, "the Signal filed provides the receiver with information about the length of the packet and how long to defer", paragraph 0055, fig. 1, fig. 4, and fig. 8).

Regarding claim 8, Gardner '709 the method, whereby a lower order receiver can interpret said transmitted duration (fig. 3, Receiving Legacy Antenna, paragraphs 0022, 0025, noted: receiver detecting the received long training symbols, paragraph 0034, "the Signal filed provides the receiver with information about the length of the packet and how long to defer", paragraph 0055, fig. 1, fig. 4, and fig. 8).

Regarding claim 9, Gardner '709 the method, wherein said duration is represented as a duration of said transmission (see, "duration of the packet", paragraph 0059, lines 1-6).

Regarding claim 10, Gardner '709 the method, wherein said duration is represented as a length of said transmission (see, "the Signal field provides the receiver with information about the length of the packet and thus how long to defer", paragraph 0054, lines 9-12).

Regarding claims 11, **21**, Gardner '709 the method, wherein said SIGNAL field (Noted: Signal according to IEEE 802.11a, paragraph 0078, 0005, fig. 1, Signal Filed, paragraph 0059, fig. 8) indicates a number (see, signaling information indicating channel number, paragraph 0058, lines 15-17) of said antennas in said multiple antenna communication system (fig. 3, MIMO Antennas 102, 104, fig. 8, see Transmitter 0, and

Transmitter 1,paragraphs 0056, 0022)

Regarding claim 12, Gardner '709 the method, wherein said number of said antennas allows said multiple antenna communication system to be scalable (noted: more than one transmit antenna or single receive antenna, paragraph 0022, lines 7-14).

Regarding claim 13, Gardner '709 the method of claim 11, wherein said number of said antennas allows a receiver to correlate channel coefficients with corresponding transmit antennas (see, at the receiver side, channel estimates for each transmitter where an impulse response is generated, paragraph 0071).

Regarding claim 38, Gardner '709 discloses a method for transmitting data (noted: transmission of multiple data streams using IEEE 802.11 and higher data devices, paragraph 009-0010) in a multiple antenna noted: method for transmitting where two or more transmitting antennas may be used, paragraph 0022, 0072, 0077, fig. 3 to fig. 4, see fig. 8, Transmitter 0, Transmitter 1) communication system having N transmit antennas (fig. 3, MIMO Antennas 102, 104, fig. 8, see Transmitter 0, and Transmitter 1,paragraphs 0056, 0022), said method comprising the step of transmitting a legacy preamble (noted: transmission of preamble using multiple antennas, paragraph 0021-0022) having at least one long training symbol (fig. 4, Long Training Symbol L2, paragraph 0035) and at least one additional long training symbol (fig. 4, Long Training Symbol L3, paragraph 0035) on each of said N transmit antennas of a transmitter (fig. 3, MIMO Antennas 102, 104, fig. 8, see Transmitter 0, and Transmitter 1,paragraphs 0056,

0022), such that said training symbols (Noted: transmission of long training symbols as referenced by fig. 4, L2 , L3, and L4, paragraphs 0034-0038) can be interpreted by a receiver having M antennas (fig. 3, Receiving Legacy Antenna (i.e. SISO), paragraphs 0022, lines 6-14, 0025, noted: receiver detecting the received long training symbols, paragraph 0034, "the Signal filed provides the receiver with information about the length of the packet and how long to defer", paragraph 0055, fig. 1, fig. 4, and fig. 8), where M is less than N (noted: more than one transmit antenna or single receive antenna, paragraph 0022, lines 7-14) and wherein said at least one training symbol comprises a plurality of N subcarriers (see, "L4 long training symbol containing plurality of subcarriers", paragraph 0052, lines 6-12).

Regarding claim 39, Gardner '709 discloses the method, wherein said legacy preamble futher comprises at least one short training symbol (fig. 1, and fig. 8, Short Training Symbol, paragraphs 0005, 0034, 0056).

Regarding claim 40, Gardner '709 discloses the method, wherein said legacy preamble further comprises at least one SIGNAL field (Noted: Signal according to IEEE 802.11a, paragraph 0078, 0005, fig. 1, Signal Field, paragraph 0059)..

Regarding claim 41, Gardner '709 discloses the method, wherein said legacy preamble is an 802.11 a/g preamble (noted: transmitting of a preamble using legacy device as referenced by IEEE 802.111 and IEEE 802.11g, paragraphs 0027-0028, 0062).

Gardner '709 discloses all the claimed limitations as set forth above with the exception of claimed features:

Regarding claims 1, 14, 38, wherein each of said subcarriers are active on only one set of N antennas at a given time.

However, Perahia '688 from the same field of endeavor discloses the above claimed features:

Regarding claims 1, 14, 38, wherein each of said subcarriers (see, each of the antennas transmitting OFDM symbols modulated by 64 subcarriers (i.e. two antennas for each two group or 64 subcarriers), col. 3, lines 55-60, col. 4, lines 11-21 and col. 5, lines 16-27, see, first set of subcarriers on first antenna element and second set of subcarriers on second antenna element at training period, col. 2, lines 41-63) are active on only one set of N antennas (fig. 1, bridge with two antenna elements respectively, col. 4, lines 11-21, col. 6, lines 48-60) at a given time (see, first set of subcarriers on first antenna element and second set of subcarriers on second antenna element at training period, col. 2, lines 41-63, (i.e. two antennas for each two group or 64 subcarriers), col. 3, lines 55-60, col. 4, lines 11-21 and col. 5, lines 16-27).

In view of the above, having the method for transmitting preamble comprises of plurality of symbols in order to provide co-existence between 802.11 devices and higher data rate MIMO devices of Gardner '709, the high data rate wireless bridging of Perahia '688, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching features of Gardner '709 by using teaching features as taught by Perahia '688 in order to provide matrix channel estimation of a MIMO channel as suggested in col. 2, lines 9-14.

9. **Claims 7, 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al (US 2005/0233709 A1) in view Perahia et al (US 7,352,688 B1) as applied to claim 1, 14 above, and further view of Kadous et al (US 2004/0121730 A1).

The combination of Gardner '709 and Perahia '688 discloses wherein said at least one training symbol comprises said a plurality of subcarriers as discussed in above paragraph with the exception of claimed features:

Regarding claim 7, wherein said transmitting step further comprises the step of diagonally loading said subcarriers across said antennas.

Regarding claim 20, wherein said subcarriers are diagonally loaded across said antennas.

However, Kadous '730 from the same field of endeavor discloses the above claimed features:

Regarding claim 7, and wherein said transmitting (fig. 3A, transmission of symbol streams diagonally from the transmitting antennas, paragraph 0076, see, transmitting of OFDM symbols on a plurality of subbands, paragraph 0013, 0043-0054, 0059) step further comprises the step of diagonally loading said subcarriers (see, transmission of symbol streams diagonally, paragraph 0076) across said N antennas (fig. 3, Transmit Antennas 1-4).

In view of the above, having the combined teaching features of Gardner '709, Perahia '688 and the transmission scheme for multicarrier MIMO systems of Kadous, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the features of Gardner '709, Perahia '688 by using features as taught

by Kadous '730 in order to provide transmit diversity for each transmitted symbol stream as suggested in paragraph 0091, 0097.

Regarding claim 20, please see the Examiner comment with respect to claim 7 as discussed above.

10. **Claims 30, 34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al (US 2005/0233709 A1) in view of Catreux et al (US 6,802,035 B2).

Regarding claims 30, **34** Gardner '709 discloses a method for communicating in a multiple antenna communication system (fig. 3, MIMO Antennas 102, 104, fig. 8, see Transmitter 0, and Transmitter 1,paragraphs 0056, 0022), said method comprising the step of transmitting one or more symbols (Noted: transmission of long training symbols as referenced by fig. 4, L2 , L3, and L4, paragraphs 0034-0038) from a transmitter having N transmit branches (fig. 3, fig. 8, Transmitter 0, Transmitter 1).

Gardner '709 discloses all the claimed limitations as set forth above with the exception of claimed features:

Regarding claim 30, obtaining feedback at the transmitter from at least one receiver indicating a performance for at least one of the N transmit branches; and adapting one or more parameters of the at least one of the N transmit branches.

Regarding claim 34, a feedback path for obtaining feedback at the transmitter from at least one receiver indicating a performance for at least one of the N transmit branches; and means for adapting one or more parameters of the at least one of the N transmit branches.

However, Catreux '035 from the same field of endeavor discloses the above claimed features:

Regarding claim 30, obtaining feedback at the transmitter (fig. 3, see feedback 390 to transmitter 395, quality parameter feedback from the receiver to base station with multiple antennas, col. 8, lines 61 to col. 9, lines 7) from at least one receiver (see the combination of fig.2 to fig. 3, fig. 2, feedback from receiver 260) indicating a performance for at least one of the N transmit branches (see, fig. 3, quality parameters 340 and 350 that are measured from the received transmission signals in order to select a transmission mode where the transmission mode relates to modulation type, coding rate, col. 3, lines 19-36, col. 4, lines 67 to col. 5, lines 15); and adapting one or more parameters of the at least one of the N transmit branches based on said feedback (see, base station with transmit antennas, col. 6, lines 54-65, col. 4, lines 28-38, the base station selecting a transmission mode based on the feedback signal (i.e. quality indicator, col. 4, lines 28-38), col. 5, lines 48-53), wherein said one or more parameters includes a modulation scheme and encoding rate (see, fig. 3, quality parameters 340 and 350 that are measured from the received transmission signals in order to select a transmission mode (col. 6, lines 1-30, table I listings of modulation types, coding rates) where the transmission mode relates to modulation type, coding rate, col. 3, lines 19-36, col. 4, lines 67 to col. 5, lines 15).

Regarding claim 34, a feedback path for obtaining feedback at the transmitter (fig. 3, see feedback 390 to transmitter 395, quality parameter feedback from the receiver to base station with multiple antennas, col. 8, lines 61 to col. 9, lines 7) from at

least one receiver (see the combination of fig.2 to fig. 3, fig. 2, feedback from receiver 260) indicating a performance for at least one of the N transmit branches (see, fig. 3, quality parameters 340 and 350 that are measured from the received transmission signals in order to select a transmission mode where the transmission mode relates to modulation type, coding rate, col. 3, lines 19-36, col. 4, lines 67 to col. 5, lines 15); and means for adapting one or more parameters of the at least one of the N transmit branches based on said feedback (see, base station with transmit antennas, col. 6, lines 54-65, col. 4, lines 28-38, the base station selecting a transmission mode based on the feedback signal (i.e. quality indicator, col. 4, lines 28-38), col. 5, lines 48-53), wherein said one or more parameters includes a modulation scheme and encoding rate (see, fig. 3, quality parameters 340 and 350 that are measured from the received transmission signals in order to select a transmission mode (col. 6, lines 1-30, table I listings of modulation types, coding rates) where the transmission mode relates to modulation type, coding rate, col. 3, lines 19-36, col. 4, lines 67 to col. 5, lines 15).

In view of the above, having the MIMO communication system for transmitting long training symbols associated with a signal field of Gardner '709, the system and method of dynamically optimizing a transmission mode of Catreux '035, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teaching features of Gardner '709 by using teaching features as taught by Catreux '035 in order to provide adaptive optimization of a transmission mode as suggested in col. 2, lines 16-20.

Allowable Subject Matter

11. Claims 22-24, 26-28 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ma et al (US 2003/0072255 A1) and Marzetta et al (US 2004/0192216 A1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CANDAL ELPENORD whose telephone number is (571) 270-3123. The examiner can normally be reached on Monday through Friday 8:00AM to 5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Bin Yao can be reached on (571) 272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Candal Elpenord/
Examiner, Art Unit 2473

/KWANG B. YAO/
Supervisory Patent Examiner, Art Unit 2473